

THE NORTH AMERICAN SPECIES OF THE *COCKERELLI*
AND *DORSASETULA* GROUPS OF THE PREDACEOUS MIDGE
GENUS *BEZZIA*, SUBGENUS *HOMOBEZZIA*
(DIPTERA: CERATOPOGONIDAE)

WILLIS W. WIRTH

Systematic Entomology Laboratory, IIBIII, Agricultural Research Service,
USDA, % National Museum of Natural History, Washington, D.C. 20560.

Abstract.—The *cockerelli* and *dorsasetula* Groups of the subgenus *Homobezzia* Macfie, genus *Bezzia* Kieffer, are represented in North America by seven species. A key is presented for the separation of these species and to distinguish them from other subgenera and groups of *Bezzia*; diagnoses are given for the groups; the American species are redescribed and illustrated; and notes are given for the larval habitats and known biology. *Bezzia modocensis* Wirth is a new junior synonym of *B. pruinosa* (Coquillett). Two new species, *Bezzia saileri* from Alaska and *B. twinni* from Manitoba, are described in the *cockerelli* Group.

This review is one of a series in which additions and corrections are made to the "Revision of the Nearctic Species of the Genus *Bezzia*" by Dow and Turner (1976). In the present series six groups have already been studied in depth since 1976: Grogan and Wirth (1981) on the genus *Amerohelea* Grogan and Wirth; Wirth and Grogan (1982) on the genus *Phaenobezzia* Haeselbarth; Wirth and Grogan (*in press*) on the *bivittata* Group of *Bezzia* subgenus *Bezzia* Kieffer; Wirth (1983) on the *nobilis* Group of the subgenus *Bezzia* s. str.; Wirth et al. (*in press*) on the *annulipes* Group of *Bezzia* subgenus *Homobezzia* Macfie; and Wirth (*in press*) on the *bicolor* Group of the subgenus *Homobezzia*. The present paper deals with the two remaining groups of the subgenus *Homobezzia*, which are here named the *cockerelli* and *dorsasetula* groups.

The first North American species to be described in these groups was *Bezzia pruinosa* (Coquillett), described from British Columbia in 1905. In 1915 Malloch described *Bezzia cockerelli* from Colorado and *Bezzia obscura* from New York. Wirth (1952) added *B. modocensis* and *B. sordida* from California, but the former is shown herein to be a junior synonym of *B. pruinosa*. Dow and Turner (1976) added descriptions of *Bezzia dorsasetula* and *B. obelisca* from New York, and sank *B. obscura* as a junior synonym of *B. cockerelli*. In this paper I present diagnoses of the *cockerelli* and *dorsasetula* groups, a key to separate the North American species and to distinguish them from other subgenera and groups of the genus *Bezzia*. Two far-northern species are described as new.

A discussion of the taxonomic characters used and a more complete discussion of the subgeneric and group classification in the genus *Bezzia* are given in the three above-mentioned papers on the *bivittata* Group, the *nobilis* Group, and the *annulipes* Group.

SYNOPTIC KEY TO SUBGENERA AND GROUPS OF NEARCTIC *BEZZIA*

- 1. Male antennal segment 12 no longer than 13, antennal plume weakly developed; (mesonotum dull, occasionally weakly shiny, brownish or grayish with or without vittae; tibiae pale or with a dark medial or basal ring; spines of forefemur stout when present; female with 0–5 pairs of gland rods; male considerably smaller than female; male aedeagus triangular with minute spinules or hairs) (Subgenus *Homobezzia* Macfie) 2
- Male antennal segment 12 longest; antennal plume well developed, extending at least to apex of 13th segment; (mesonotum black, shiny or dull or with silvery hairs, if grayish brown with dark vittae, hindtibia yellow in midportion, apex broadly black, and all femora bear spines; tibiae often black; forefemur with spines slender when present; female abdomen with 1–2 pairs of gland rods; male about same size as female; male aedeagus variable but not as above Subgenus *Bezzia* Kieffer, s. str.

Subgenus *Homobezzia* Macfie

- 2. Larger species, female wing 1.3–3.4 mm long; mesonotum without bristly setae on disc; (forefemur without spines or with 1–4 stout to slender spines of similar lengths, with or without strong basal tubercles; pupal respiratory horn with numerous (25–60) spiracular openings, apex more or less flared, abdominal tubercles well developed) 3
- Small species, female wing 1.2–1.3 mm long; mesonotum with 2 rows of strong bristly setae on disc; (forefemur with 5–7 stout ventral spines of alternating uneven lengths arising from distinct elevations; pupal respiratory horn with only 7–12 spiracular openings, abdominal tubercles small) (*dorsasetula* Group) 9
- 3. Forefemur unarmed ventrally *bicolor* Group 4
- Forefemur armed ventrally with one or more short black spines 4
- 4. Fore- and midfemora entirely dark brown or with dark bands apical (*cockerelli* Group) 5
- Fore- and midfemora with subapical dark bands *annulipes* Group

cockerelli group

- 5. Forefemur with 4–5 ventral spines; antenna uniformly black, segments definitely more slender distad; female antennal ratio 1.00; male plume long, dense and blackish; mesonotum without strong discal setae, setae above wing bases long and black; spermathecae small and globular to slightly ovoid with short necks *pruinosa* (Coquillett)
- Forefemur with 2 (rarely 3) ventral spines; antenna paler, segments usually with paler bases; male plume shorter and sparse; setae above wing bases shorter and paler; mesonotum and spermathecae various 6
- 6. Spermathecae large and oval without distinct necks; mesonotum yellowish with 3 broad brownish vittae; antenna short, female antennal ratio 0.77 *cockerelli* Malloch
- Spermathecae small and globular to ovoid with short necks; mesonotum uniformly pale to dark brownish; antennal segments various 7
- 7. Mesonotum without strong discal setae; femora and tibiae varying from

- yellowish with subbasal brown bands on fore- and hindtibiae to entirely dark brown; antennal segments slender and tapering, antennal ratio 1.00
 *sordida* Wirth
- Mesonotum with scattered enlarged setae on disc; leg pattern various; antennal segments short and not tapering, antennal ratio 0.70–0.82 8
8. Mesonotum with dense vestiture of scattered enlarged setae; legs yellowish with only knee spots and apices of tibiae dark brown; female antennal ratio 0.82; male genitalia in outline forming an incomplete circle, the basistyle short and stout to tip *saileri*, new species
- Mesonotum with sparse scattered enlarged setae; legs brownish except narrow bases of segments pale; female antennal ratio 0.70; male genitalia of form typical of group, basistyle with mesal hump at base
 *twinni*, new species

dorsasetula group

9. Larger species, female wing length 1.37 mm; wing slender, 3.3× longer than broad; tibiae with pale rings; forefemur with 6–7 spines; antennal segments longer and more slender; male aedeagus with broad basal arch, concave sides; male antennal segment 12 with 4–5 long black setae, 13 with one long black seta, 14 without such setae
 *dorsasetula* Dow and Turner
- Smaller species, female wing length 1.23 mm; wing broader, 2.8× longer than broad; legs uniformly brown; forefemur with 4–5 ventral spines; antennal segments shorter and stouter; male aedeagus with narrow base, low arch, and straight sides, tapered to tip; male antenna with ring of long black setae on segments 12–14 *obelisca* Dow and Turner

Genus *Bezzia* Kieffer

Subgenus *Homobezzia* Macfie

The *cockerelli* Group

Diagnosis.—Large, pollinose grayish to dark brown species, female wing length 2.4–2.8 mm. Legs usually yellowish with knees and narrow apices of tibiae dark brown, distal portions of femora and subbasal bands of tibiae sometimes brownish, but bands never subapical on femora; femora and tibiae often entirely brown in *B. pruinosa* (Coquillett). Legs rather stout, forefemur with 2–4 short, stout, black, ventral spines. Wing grayish, unmarked; costal ratio 0.77. Halter dark. Abdomen uniformly subshining brownish, 2–3 pairs of brownish gland rods. Antenna with segments rather short, tip of last segment bluntly rounded. Male with distinct mandibular teeth. Male genitalia typical of subgenus *Homobezzia*, basistyle without mesal lobe or swelling at base; 9th sternum with broad, moderately deep, caudomedian excavation; aedeagus about as long as basal breadth, with well-developed basal arch and slender tip; parameres slender, rodlike distally. Pupa with flaring respiratory horn with numerous (25–50) spiracular openings in a convoluted row around distal portion; abdominal segments broadened in mid-portion with prominent conical lateral tubercles; last abdominal segment with posterolateral processes long and slender, spiculate. Larva with long, slender,

subcylindrical head; last segment with prominent, black, anteriorly directed, caudal hairs.

Remarks.—There are five North American species in the *cockerelli* Group, *Bezzia cockerelli* Malloch, *B. pruinosa* (Coquillett), *B. sordida* Wirth, plus two new northern species. *Bezzia cockerelli* is closely related to the Palearctic species, *B. xanthocephala* Goetghebuer, and paler adults of *cockerelli* cannot be distinguished from *xanthocephala*. The larvae and pupae of the two species are readily distinguished by the characters given in the discussion that follows under the species *cockerelli*. Species of this group have been reared from marshy and swampy ponds and from algal mats.

Bezzia cockerelli Malloch

Fig. 1

Bezzia cockerelli Malloch, 1915: 346 (female; Colorado); Johannsen, 1943: 785 (in list); Dow and Turner, 1976: 85 (male, female redescribed; figs.; distribution; synonym: *obscura*).

Probezzia obscura Malloch, 1915: 355 (female; New York); Johannsen, 1943: 785 (in list).

Bezzia obscura (Malloch), Wirth, 1951: 325 (combination; notes on type).

Female.—Wing length 2.43 mm; breadth 0.80 mm.

Head: Brown; with dense bristly setae. Eyes separated by a distance of 0.090 mm. Antenna (Fig. 1a) uniformly blackish; lengths of flagellar segments in proportion of 28-15-14-13-12-12-12-13-18-18-18-19-19, antennal ratio 0.77. Palpus (Fig. 1c) with lengths of segments in proportion of 8-15-23-15-20; palpal ratio 2.9. Mandible (Fig. 1e) with 11 teeth.

Thorax: Dark brown with dense brownish pubescence; mesonotum pale brownish pollinose, a broad median anterior vitta and a pair of vittae above wings darker brown. Prealar setae 6-10, postalar seta 1, long stout, and blackish; scutellum yellowish, with 8 similar marginal setae. Legs (Fig. 1k) yellowish to pale brown, knees and ends of tibiae narrowly blackish, tarsomeres 3-5 brown; forefemur (Fig. 1j) with 2 (rarely 3) short, stout, black, ventral spines distally; claws as in Fig. 1f. Some specimens with varying amounts of dark brown infuscation on legs, especially on distal ½ of hindfemur. Wing (Fig. 1d) grayish, anterior veins yellowish brown; costal ratio 0.77. Halter pale brown.

Abdomen: Subshining brown, densely setose on sides and on caudal segments; terga with sparse setae. Two pairs of short, brownish, gland rods. Genital sclerotization (Fig. 1i): 8th sternum with an H-shaped pigmented area anterior to gonopore; 9th sternum without pigmented processes. Spermathecae (Fig. 1h) 2 plus rudimentary 3rd; elongate oval without necks, deeply pigmented; slightly unequal, measuring 0.115 by 0.084 mm and 0.100 by 0.070 mm.

Male.—Wing length 1.54 mm; breadth 0.54 mm. Similar to female with usual sexual differences. Antenna (Fig. 1b) with lengths of flagellar segments in proportion of 20-11-11-11-10-10-10-11-11-14-16-17-17; plume sparse and brown, arising from segments 3-12. Mandible (Fig. 1g) with 4-6 distinct teeth. Thorax uniformly dark brown. Legs darker than in female, femora and tibiae brownish except at bases.

Genitalia (Fig. 1m) elongate, dark brown, with strong black setae. Ninth sternum

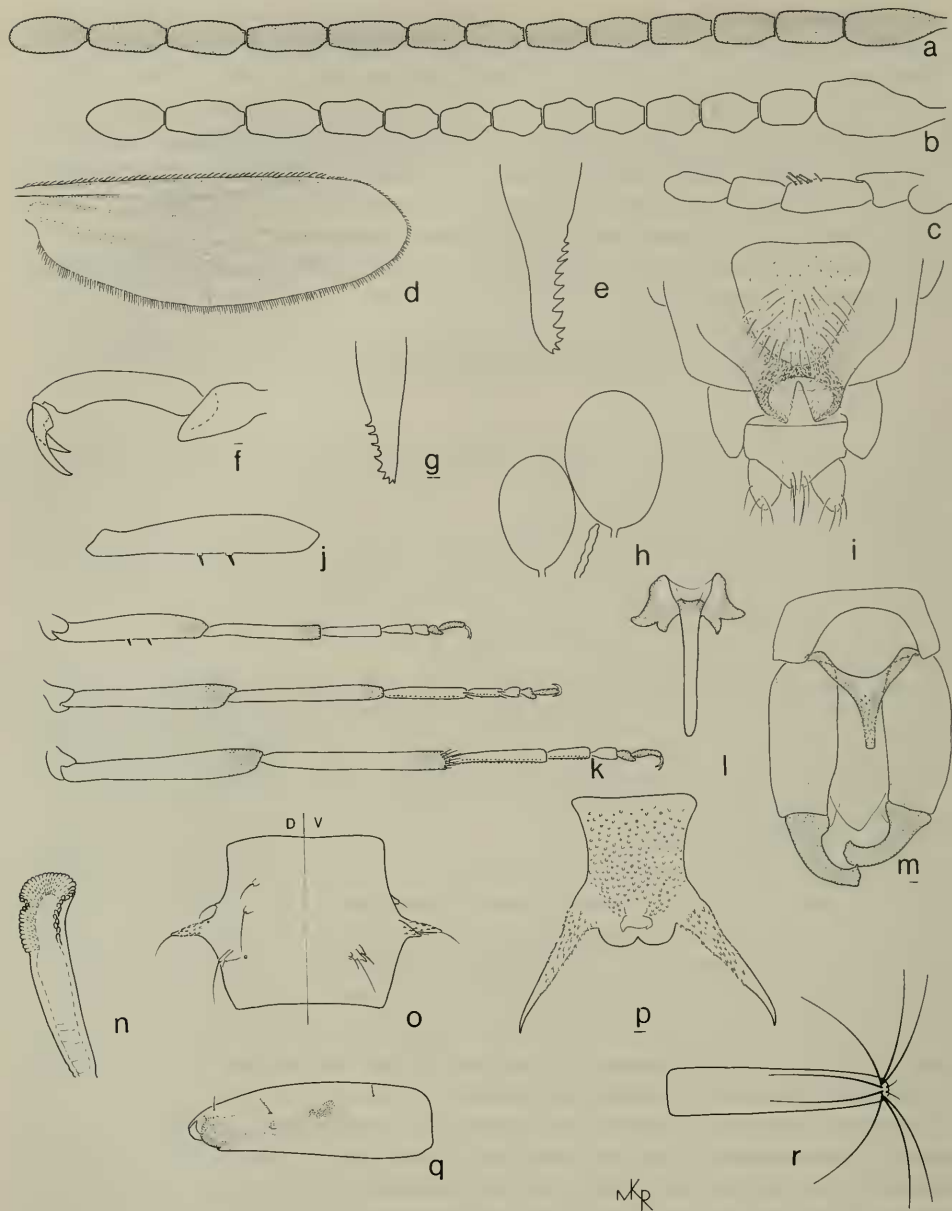


Fig. 1. *Bezzia cockerelli*. a, c-f, h-k, Female. b, g, l-m, Male. n-p, Pupa. q-r, Larva. a, b, Antenna. c, Palpus. d, Wing. e, g, Mandible. f, Tarsomeres 4 and 5 and claws of hindleg. h, Spermathecae. i, Genital sclerotization. j, Forefemoral spines. k, Color pattern of fore-, mid-, and hindlegs (top to bottom). l, Parameres. m, Genitalia, parameres omitted. n, Respiratory horn. o, Dorsal and ventral views of fourth abdominal segment. p, Last abdominal segment. q, Head, side view. r, Last segment, dorsal view.

with broad, deep, caudomedian excavation; basistyle $3\times$ as long as broad, not broadened proximally; dististyle $\frac{1}{2}$ as long as basistyle, heavily sclerotized blackish, with reduced setae, strongly hooked distally with blunt tip; aedeagus with

long, slender, basal arms, low basal arch, and short, slender, distal process forming nearly an equilateral triangle with concave sides, distal process strongly spiculate. Parameres (Fig. 1l) with anterolateral plates not deeply lobed, anteromedian cleft a low arch; distal process a very slender, long, straight rod with parallel sides.

Pupa.—Length about 5 mm; color uniform light brown, some dark markings on body segments. Respiratory horn (Fig. 1n) 0.40 mm long, with moderately slender base and flaring tip; 35–40 spiracular openings in a convoluted row around distal $\frac{1}{3}$ of horn; tip of horn darker. Integument of cephalothorax micro-rugulose, that of abdomen micro-granulose (pebble-grained). Abdominal segments (Fig. 1o) broad in midportion, the lateral tubercles long and somewhat conical with sharp, thornlike tips, spinulose proximally; 2 pairs of *dasm* tubercles located close together and nearly in line longitudinally, each with a small hyaline seta, a small, pigmented, spineless, 3rd tubercle located just ahead and laterad of *dasm*2. The *dpm* tubercles fused together with bidentate posterior margin, bearing 2 small hyaline setae; *vpm* tubercles also fused together, with 2 sharp points and 2 minute hyaline setae; *lasm* tubercle minute, located just ahead of *lpml*, with a small hyaline seta. Last abdominal segment (Fig. 1p) strongly shagreened, with posterolateral processes about as long as main part of segment, strongly spiculate, strongly diverging, nearly straight, and tapering to sharp spinelike tips.

Larva (Fig. 1q–r).—Length about 10 mm; head 0.48 mm long by 0.16 mm broad. Head pale amber colored, body creamy yellowish. Structure and chaetotaxy nearly identical with that figured by Glukhova (1979) for *Bezzia xanthocephala*; last body segment with 4 pairs of long, black, anteriorly directed, caudal hairs $\frac{1}{2}$ as long as segment, plus 2 pairs of much smaller setae.

Comment.—The larva of *Bezzia xanthocephala* Goetghebuer is nearly identical with that of *B. cockerelli*, but according to the figures of Goetghebuer (1911, 1914) and Glukhova (1979) the long anal hairs are much longer, nearly as long as the last body segment. There are 45–50 spiracular openings in the pupal respiratory horn of *B. xanthocephala*, according to Zilahi-Sebess (1930, as *hungarica*), while there are only 35–40 in *B. cockerelli*.

Types.—Of *cockerelli*, holotype ♀, Modern, Colorado, 28.v, T.D.A. Cockerell (Illinois Natural History Survey, Urbana); of *obscura*, holotype ♀, Ithaca, New York, 15.vii.1901, O. A. Johannsen (in INHS). Both types were examined by Wirth in 1950 through the courtesy of Dr. H. H. Ross.

Recorded distribution.—Alaska, Colorado, Idaho, Iowa, Michigan, Minnesota, Montana, Nebraska, New York, North Dakota, Utah, Washington (Dow and Turner, 1976).

New records.—ALBERTA: Brooks, 3–7.vii.1955, J. A. Downes, 2 ♂, 2 ♀. BRITISH COLUMBIA: Kamloops, 17.vi.1955, Downes, 1 ♀. IDAHO: Latah Co., Trails Pond, 22.vii.1969, Janice Gillespie, reared from algal mats, 4 larvae, 2 pupae, 4 ♂, 3 ♀, with pupal exuviae. MANITOBA: Churchill, 27.vii.1953, Downes, 7 ♂, 4 ♀ (CNC). MONTANA: Roosevelt Co., Bainville, 9.vi.1969, W. W. Wirth, 1 ♂ with pupal exuviae. NEW BRUNSWICK: Kouchibouguac Natl. Park, 2.vii.1977, 9–12.vii.1978, J. R. Vockeroth and L. Forster, 1 ♂, 3 ♀. NORTH DAKOTA: McHenry Co., 4 mi N Upham, 5.vi.1969, Wirth, 2 ♂, 3 ♀, with pupal exuviae. ONTARIO: Constance Bay, 1.viii.1961, Downes, 1 ♂. WISCONSIN: Dodge Co., Horicon Marsh, 7.vii.1978, W. R. Atchley and K. Kann, 1 ♀ with pupal exuviae.

Discussion.—Dow and Turner made a somewhat equivocal indication of the

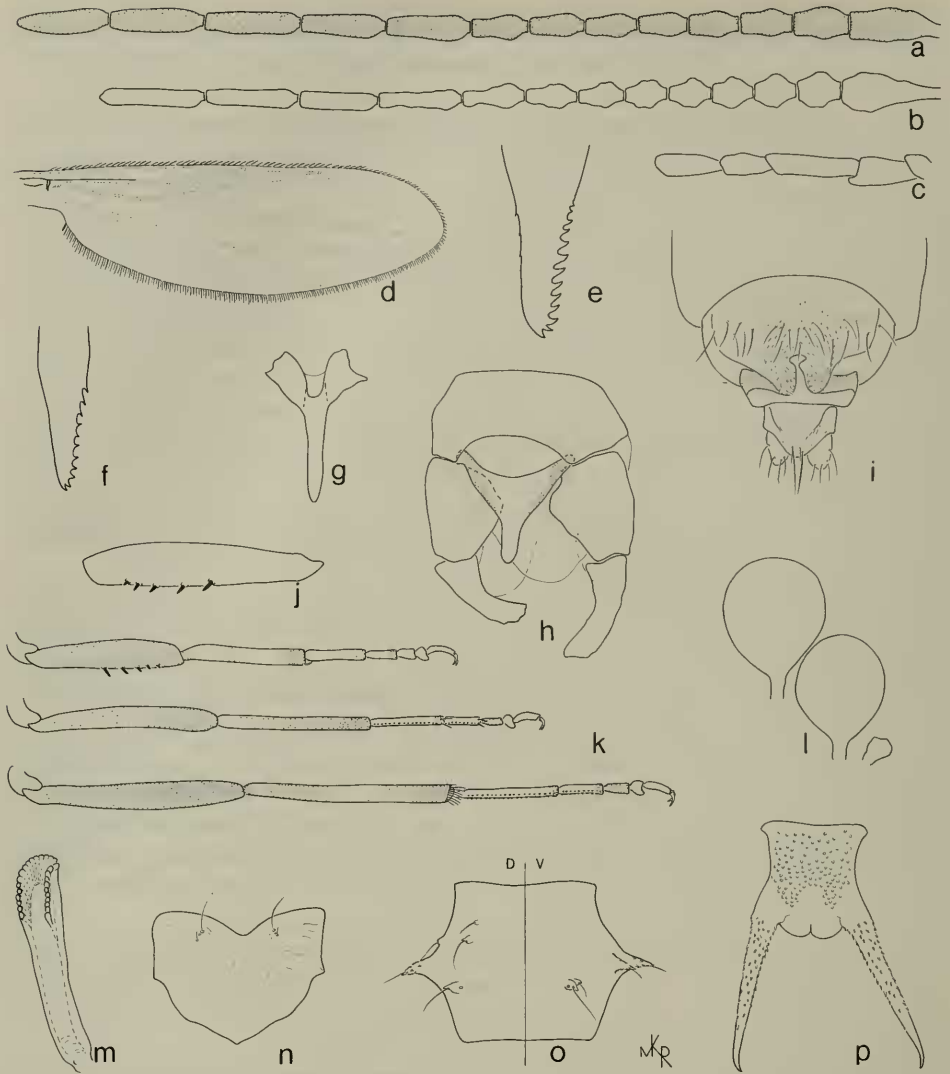


Fig. 2. *Bezzia pruinosa*. a, c–e, i–l, Female. b, f–h, Male. m–p, Pupa. a, b, Antenna. c, Palpus. d, Wing. e, f, Mandible. g, Parameres. h, Genitalia, parameres omitted. i, Genital sclerotization. j, Forefemoral spines. k, Color pattern of fore-, mid-, and hindlegs (top to bottom). l, Spermathecae. m, Respiratory horn. n, Operculum. o, Dorsal and ventral views of fourth abdominal segment. p, Last abdominal segment.

synonymy of *B. obscura*: "Careful comparison of Malloch's (1915) description of *B. obscura* with that of *B. cockerelli* and comparison of the types seem to indicate that these two species are indeed one. While only dissection of the terminalia and microscopic examination can positively affirm this hypothesis, they are treated as such in this paper. Since *B. cockerelli* occurs earliest in the paper, it becomes the senior synonym and takes precedence. Wirth (1951) corroborates the presence of ventral forefemoral spines on Malloch's type of *B. obscura*." The present study confirms the synonymy.

The Palearctic species *Bezzia xanthocephala* Goetghebuer is nearly identical with *B. cockerelli* except for the following differences. In *B. xanthocephala* the legs are yellow, narrowly brown only on the knees and apices of the tibiae, tarsomeres 4, 5, and the tip of 3 brown; the female genital sclerotization lacks the X-shaped brown eighth sternum, but has two narrow oblique lines; and the pupa has long hyaline setae on the lateral tubercles as in *B. pruinosa* (see figures in Zilahi-Sebess, 1930).

***Bezzia pruinosa* (Coquillett)**

Fig. 2

Ceratopogon pruinus Coquillett, 1905: 59 (female; British Columbia).

Bezzia pruinosa (Coquillett); Malloch, 1914: 282 (combination; in key); Malloch, 1915: 345 (in key); Johannsen, 1943: 785 (in list); Dow and Turner, 1976: 61 (notes on type; figs.).

Bezzia modocensis Wirth, 1952: 233 (male, female; California; figs.); Wirth and Stone, 1968: 437 (in key); Dow and Turner, 1976: 99 (redescribed; figs.; distribution). **NEW SYNONYMY.**

Female.—Wing length 2.9 mm, breadth 1.0 mm.

Head: Dark brown including antenna and palpus. Eyes broadly separated, a distance of 0.087 mm. Antenna (Fig. 2a) without pale bases of segments, segments definitely more slender distally; lengths of flagellar segments in proportion of 30-20-20-20-20-20-20-20-32-32-35-38-40, antennal ratio 1.04. Palpus (Fig. 2c) with lengths of segments in proportion of 7-20-30-16-23; 3rd segment slender, palpal ratio 4.3. Mandible (Fig. 2e) with 13 teeth, the proximal 3-4 gradually smaller.

Thorax: Uniformly dark brown; mesonotum with dense pubescence, no stronger setae on disc; 8 very long, strong, black, prealar setae above wing base, 1 postalar; scutellum with 8 similar marginal setae. Legs (Fig. 2k) yellowish brown to brown; dark brown on distal 3rd of forefemur, all of mid- and hindfemora, broad subbasal band on hindtibia, and narrow apices of tibiae and tarsomeres 1 and 2, tarsomeres 3-5 brown (in type series of *modocensis*, legs uniformly dark brown, almost blackish, including tarsi); forefemur with 4-5 short, stout black spines (Fig. 2j). Wing (Fig. 2d) brownish hyaline, anterior veins brown; costal ratio 0.77. Halter dark brown.

Abdomen: Brown; sparsely clothed with moderately long setae; 3 pairs of moderately long dark brown gland rods; genital sclerotization as in Fig. 2i, without strong pigmentation. Spermathecae (Fig. 2l) 2 plus rudimentary 3rd strongly pigmented; ovoid with moderately long slender necks; unequal, measuring 0.070 by 0.061 mm plus neck 0.014 mm long, and 0.062 by 0.054 mm with neck 0.012 mm.

Male.—Wing length 2.5 mm, breadth not measured; costal ratio 0.75. Similar to female with usual sexual differences; color darker and setae of legs and abdomen longer and more spinelike; supra-alar setae especially stronger, 12 on each side. Antenna (Fig. 2b) with lengths of flagellar segments in proportion of 45-20-20-20-20-22-24-30-40-38-42-45, antennal ratio 1.04; plume dense, with long, black, bristly verticils. Mandible (Fig. 2f) with 4-5 distinct teeth. Genitalia (Fig. 2h) with dististyle as long as basistyle, stout with blunt-pointed tip; 9th sternum with broad caudomedian excavation to 1/3 of total length, distal process slender and scarcely tapering, ventral spicules not distinct; parameres (Fig. 2g) with basal

processes broad and not distinctly bilobed, distal process long and slender, slightly attenuated subbasally, with somewhat tapering, rounded tip.

Female pupa.—Length 5.2 mm. Nearly identical with pupa of *B. sordida*, but integument not so strongly shagreened. Respiratory horn (Fig. 2m) 0.32 mm long, shorter than in *sordida* and not so slender proximally or flaring at tip; with 26 spiracular openings in a convoluted row on distal portion. Operculum as in Fig. 2n; abdominal segments as in Fig. 2o; last abdominal segment as in Fig. 2p.

Distribution.—British Columbia to Ontario, south to California, Michigan, and New York.

Types.—Holotype ♀ of *pruinosa*, Bear Lake, British Columbia, 20.vii, R. P. Currie (pinned type no. 8352, USNM). Holotype ♀ of *modocensis*, allotype ♂, and 7 ♀ paratypes, Dismal Swamp, Modoc Co., California, 15.vii, 1948, W. W. Wirth, swept from stream margin, 8000 ft (Type no. 59961, USNM).

Other specimens examined.—BRITISH COLUMBIA: Hector, 19.vi.1932, O. Bryant, 1 ♀ (CAS). CALIFORNIA: Humboldt Co., Mad River Beach, 14.viii.1948, W. W. Wirth, 1 ♂ (paratype of *sordida*). MICHIGAN: Bay Co., 17.v.1954, R. R. Dreisbach, 1 ♀. Midland Co., 26.v.1945, Dreisbach, 1 ♂, 1 ♀. Alto, Campau, 15.v.1937, C. W. Sabrosky, 1 ♀. NEW YORK: Erie Co., E. Concord Bog, 1.vi.1963, Wirth, maple swamp, 1 ♀. ONTARIO: Bell's Corners, 21.v.1951, J. F. McAlpine, 1 ♂ (CNC). Marmora, 7.v.1952, J. R. Vockeroth, 5 ♂ (CNC). Mer Bleue, 10.v.1938, G. E. Shewell, 2 ♀ (CNC). WASHINGTON: Pacific Co., Nahcotta, 24.v.1917, A. L. Melander, 4 ♂, 2 ♀. Pierce Co., Fort Lewis, 4.v.1946, P. H. Arnaud, Jr., 2 ♀ (CAS). WISCONSIN: Washburn Co., 8.vi.1952, 4, 19.vi.1953, R. H. Jones, 2 ♀.

Discussion.—The synonymy of *Bezzia modocensis* Wirth with *B. pruinosa* is based on comparison of types, as well as detailed study of fresh slide-mounted paratypes of *modocensis* with the northeastern specimens of *pruinosa* listed above. These paratypes appear to be melanistic forms of the rather widespread and somewhat variable species *pruinosa*.

Bezzia saileri Wirth, NEW SPECIES

Fig. 3

Female holotype.—Wing length 2.20 mm, breadth 0.72 mm.

Head: Brown. Eyes broadly separated, a distance of 0.080 mm. Antenna (Fig. 3a) brown, bases of flagellar segments pale; lengths of flagellar segments in proportion of 30-15-14-14-14-14-15-20-22-21-21-22, antennal ratio 0.82; segment 11 2.5× as long as broad and 1.35× as long as 10. Palpus (Fig. 3c) with lengths of segments in proportion of 8-12-20-13-17; 3rd segment short and slender, palpal ratio 2.5. Mandible (Fig. 3e) with 8 strong distal teeth plus 4-5 minute proximal denticles.

Thorax: Uniformly dull brown; mesonotum with uniform, moderately dense vestiture of long brown setae about as long as those on scutellum and about 3× as long as underlying pubescence; scutellum with 8-10 brown marginal setae. Legs (Fig. 3i) uniformly dull yellowish brown, knee spots and narrow apices of tibiae dark brown; tarsomeres 4-5 pale brown; forefemur with 2 (3 in some paratypes) stout brown ventral spines borne on distinct tubercles (Fig. 3f); claws as in Fig. 3h. Wing (Fig. 3d) whitish hyaline, anterior veins pale; costal ratio 0.75. Halter brownish.

Abdomen: Uniformly pale brown, clothed with sparse pale brown setae; 1 pair

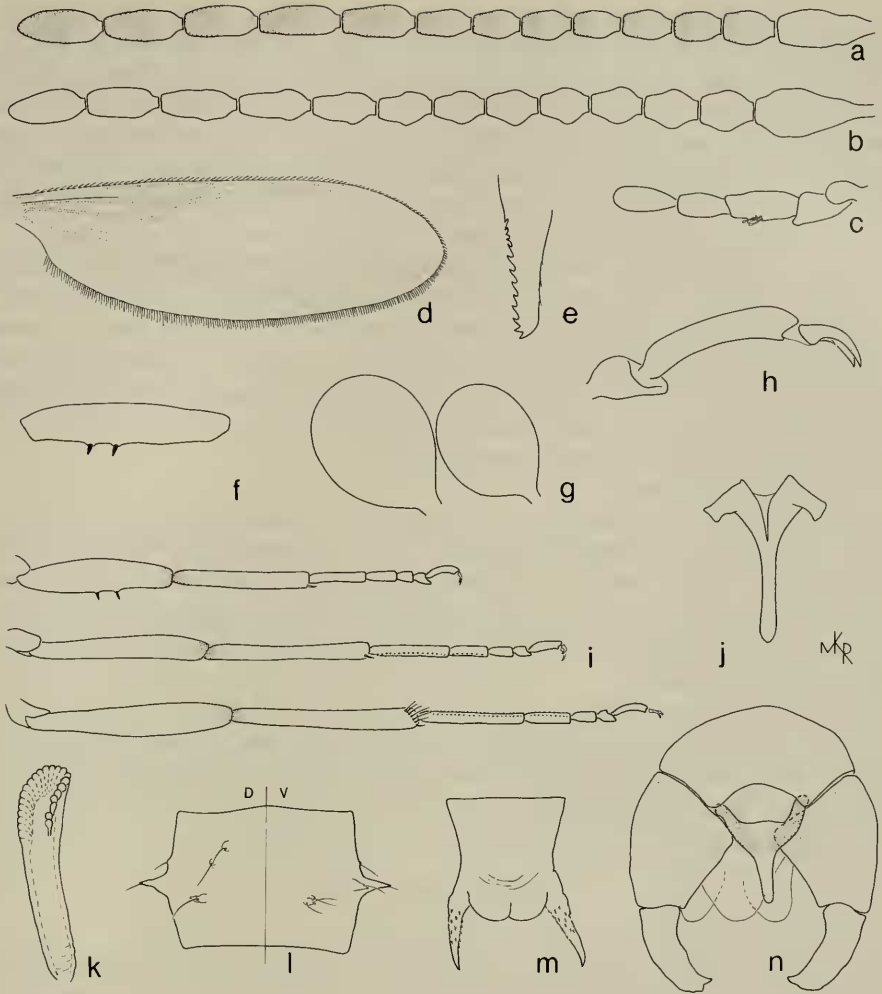


Fig. 3. *Bezzia saileri*. a, c-i, Female. j, n, Male. k-m, Pupa. a, b, Antenna. c, Palpus. d, Wing. e, Mandible. f, Forefemoral spines. g, Spermathecae. h, Fourth and fifth tarsomeres and claws of hindleg. i, Color pattern of (top to bottom) fore-, mid-, and hindlegs. j, Parameres. k, Respiratory horn. l, Dorsal and ventral views of fourth abdominal segment. m, Last abdominal segment. n, Genitalia, parameres omitted.

of hyaline to brownish gland rods about as long as 2 segments. Genital sclerotization not pigmented. Spermathecae (Fig. 3g) 2 plus rudimentary 3rd, ovoid, tapering to short, distinct necks; unequal, measuring 0.087 by 0.067 mm and 0.073 by 0.054 mm including necks.

Male allotype.—Wing length 1.62 mm, breadth 0.51 mm; costal ratio 0.74. Similar to female with usual sexual differences; femora and tibiae slightly darker brown than in female. Antenna (Fig. 3b) with lengths of flagellar segments in proportion of 30-15-15-15-15-14-14-15-16-19-22-20-22, antennal ratio 0.75; plume sparse, pale yellowish. Genitalia (Fig. 3n) with anterior margin of 9th sternum and lateral margins of basistyles and dististyles forming a nearly circular

outline; 9th sternum much narrower and longer than usual in the *cockerelli* Group; basistyle short and stout, tapering, less than twice as long as basal breadth; dististyle stout, blunt, ending in a distinct mesal tooth; aedeagus about as broad as long, basal arms strongly sclerotized, basal arch to $\frac{1}{3}$ of total length, anterior margin strongly pigmented, distal process only slightly tapering, ending in a rounded hyaline point and a ventral, minutely pubescent portion nearly as long; parameres (Fig. 3j) of usual structure, basal processes well developed and distal process elongate and unusually slender.

Pupa.—Length 3.8 mm. Nearly identical with pupa of *B. cockerelli* but differing as follows: Respiratory horn (Fig. 3k) 0.32 mm long, with 25 spiracular openings in only a slightly convoluted row. Integument of body smooth, lateral tubercles (Fig. 3l) much smaller and bearing stout distal spines and lacking spicules on proximal portion. Last abdominal segment (Fig. 3m, female) $1.1\times$ as long as broad in female, 1.35 in male, with posterolateral processes spinulose at base, not strongly diverging, tapering to sharp, spinelike tips.

Distribution.—Alaska.

Types.—Holotype ♀, allotype ♂, Fire Lake, Anchorage, Alaska, 2.vi.1948, R. I. Sailer (deposited in USNM). Paratypes, 14 ♂, 4 ♀, 6 pupae, same data as types.

Discussion.—This species is named for Reece I. Sailer of the University of Florida in appreciation of his long friendship and in recognition of his important work on the bionomics of Alaskan biting flies while a member of the Alaskan Insect Control Project.

Bezzia saileri keys out to *B. kuhetiensis* Remm in Remm's (1974) key, but that species is a eurytopic summer species, frequently found around springs, in the Soviet Transcaucasus and Central Asia. According to Remm's (1967) figures, *B. kuhetiensis* differs markedly from *B. saileri* in details of the female antenna, spermathecae, genital sclerotization, and male genitalia.

Bezzia sordida Wirth

Fig. 4

Bezzia sordida Wirth, 1952: 232 (male, female; California; figs.); Wirth and Stone, 1968: 437 (in key); Dow and Turner, 1976: 108 (redescribed; figs.; distribution).

Female.—Wing length 2.8 mm; breadth 0.80 mm.

Head: Brown. Eyes broadly separated, a distance of 0.100 mm. Antenna (Fig. 4a) brown, narrow bases of flagellar segments pale; lengths of flagellar segments in proportion of 30-20-17-17-17-17-17-17-28-28-28-28-40, antennal ratio 1.00. Palpus (Fig. 4c) with lengths of segments in proportion of 7-16-30-15-16; 3rd segment long and slender, palpal ratio 4.3. Mandible (Fig. 4e) with 10 teeth.

Thorax: Dull brown, humeri grayish black, slightly pruinose; mesonotum and scutellum with fine appressed brown pubescence; 3 long, stout, pre-alar setae, 1 postalar; scutellum with 4 long, black, marginal setae. Legs (Fig. 4j) brownish yellow; coxae and trochanters brown; apices of fore- and midfemora and apices of all tibiae narrowly brown, hindfemur brown on distal $\frac{1}{2}$ to $\frac{2}{3}$, all tibiae with faint, broad, subbasal, brown bands; narrow apices of tarsomeres 1-2 and all of 3-5 brown; forefemur (Fig. 4g) with 3-5 stout ventral spines; claws as in Fig. 4f. Wing (Fig. 4d) brownish hyaline, anterior veins brown; costal ratio 0.77. Halter dark brown.

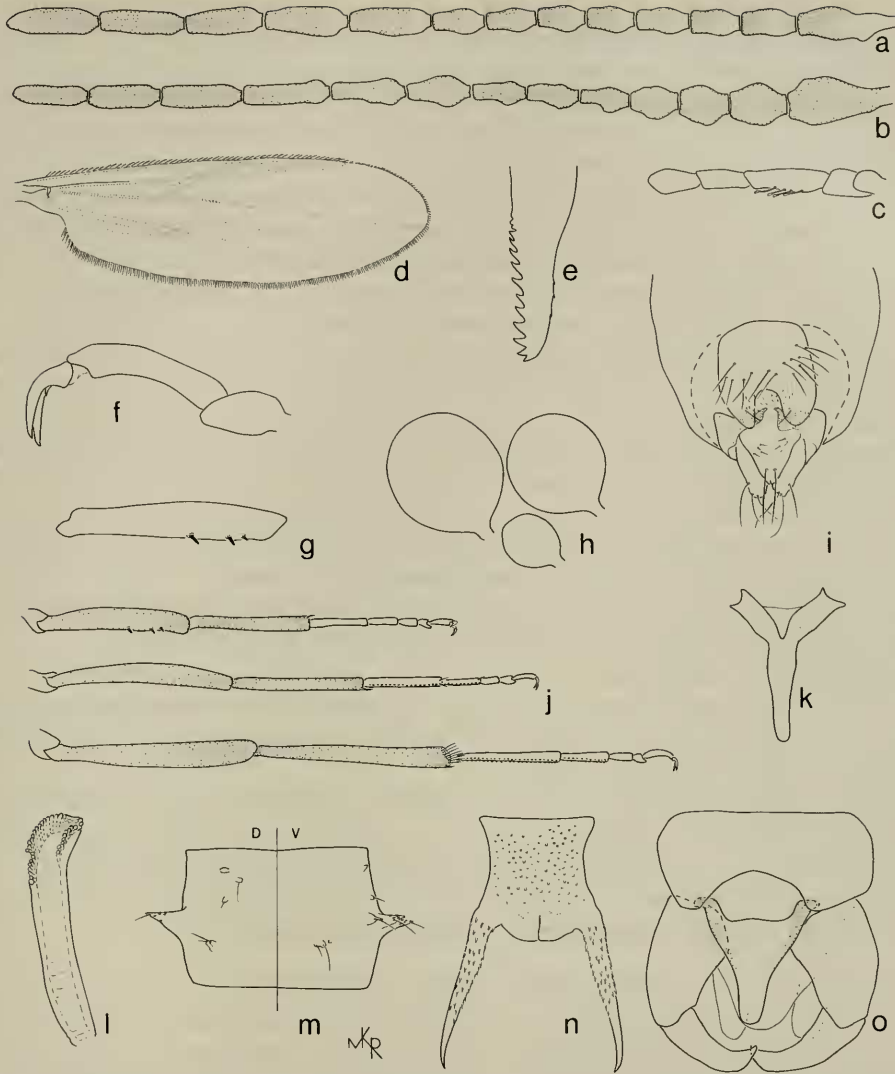


Fig. 4. *Bezzia sordida*. a, c-j, Female. k, o, Male. l-n, Pupa. a, b, Antenna. c, Palpus. d, Wing. e, Mandible. f, Fourth and fifth tarsomeres and claws of hindleg. g, Forefemoral spines. h, Spermathecae. i, Genital sclerotization. j, Color pattern (top to bottom) of fore-, mid-, and hindlegs. k, Parameres. l, Respiratory horn. m, Dorsal and ventral views of fourth abdominal segment. n, Last abdominal segment. o, Genitalia, parameres omitted.

Abdomen: Subshining dark brown dorsally; distal segments with rather long brown setae on sides; 3 pairs of moderately long brownish gland rods. Genital sclerotization (Fig. 4i) with 8th sternum poorly pigmented, bilobate on caudal margin flanking gonopore; processes of 9th sternum moderately sclerotized. Spermathecae (Fig. 4h) 2 plus rudimentary 3rd; globular with very short, slender necks; small and unequal, measuring 0.070 by 0.061 mm and 0.058 by 0.050 mm.

Male.—Wing length 1.70 mm. Similar to female with usual sexual differences;

color darker and setae of legs and abdomen longer and more spinelike. Antenna (Fig. 4b) with lengths of flagellar segments in proportion of 30-17-17-17-17-17-17-20-23-30-30-30-30, antennal ratio 1.00; plume moderately dense, of long, bristly blackish verticils. Mandible with 4-5 distinct teeth. Genitalia (Fig. 4o) dark brown with long bristly setae, nearly as broad as long. Ninth sternum rather long with moderately deep and broad caudomedian excavation; basistyle short, broad at base and tapering evenly to tip, without mesal lobe or swelling; dististyle as long as basistyle, evenly curved and tapering to slightly pointed tip; aedeagus slightly longer than basal breadth, basal arms and distal process stouter than those of *B. cockerelli*, ventral surface not spiculate. Parameres (Fig. 4k) with anterolateral arms flaring, winglike; distal process slender, slightly curved, spindle-shaped.

Pupa.—Length 5.2 mm. Nearly identical with pupa of *B. cockerelli* but differing as follows: Respiratory horn (Fig. 4l) and 0.47 mm long, more evenly slender on proximal $\frac{1}{2}$, flaring abruptly at distal $\frac{1}{4}$, with 34 spiracular openings in a convoluted row on flared portion. Abdominal segments (Fig. 4m) with lateral tubercles directed slightly more caudad, each with distinct subapical spine bearing a long hyaline seta similar to those of *Bezzia xanthocephala* as figured by Zilahi-Sebess (1930). In *B. cockerelli* this seta shorter and borne subapically on conical tubercle. Last abdominal segment (Fig. 4n) with posterolateral processes longer, 1.4 \times as long as main part of segment, more abruptly bent at base and directed more caudad like those figured by Zilahi-Sebess (1930) for *B. xanthocephala*.

Distribution.—California.

Types.—Holotype ♀, allotype ♂, 12 ♂, 26 ♀ paratypes, Oceano Beach, San Luis Obispo Co., California, 20.viii.1948, W. W. Wirth, swept from pond margin back of beach (Type no. 59960, USNM).

Other specimens examined.—CALIFORNIA: Marin Co., Olema, 22.ii.1947, H. P. Chandler, 2 ♀ and pupal exuviae. San Luis Obispo Co., Black Lake Canyon, 22.viii.1948, W. W. Wirth, swept from trees at lake margin, 4 ♀ (paratypes).

Discussion.—This species appears to have a limited distribution, which from our records includes only areas near the coast in California.

Bezzia twinni Wirth, NEW SPECIES

Fig. 5

Female holotype.—Wing length 2.50 mm, breadth 0.83 mm.

Head: Uniformly dark brown including antenna and palpi. Eyes broadly separated, a distance of 0.086 mm. Antenna (Fig. 5a) with lengths of flagellar segments in proportion of 30-16-15-14-14-13-13-15-17-17-17-20-20, antennal ratio 0.70; segments not tapering, last segment with bluntly rounded tip. Palpus (Fig. 5c) short and stout, lengths of segments in proportion of 7-13-18-15-12, 3rd segment 2.3 \times as long as broad. Mandible (Fig. 5e) with 8 strong distal teeth plus 2-3 minute proximal denticles.

Thorax: Uniformly dark brown; mesonotum with usual fine pubescence plus sparse, scattered, long brown setae about 3 \times as long as the underlying pubescence; scutellum with 8-10 long brown marginal setae. Legs (Fig. 5k) brown, dark brown towards apices of femora and paler at bases of all femora and tibiae; proximal portions of tarsomeres 1-2 paler; forefemur (Fig. 5h) with 2 short stout black spines arising from distinct low tubercles; claws as in Fig. 5f. Wing (Fig. 5d) grayish, anterior veins brown; costal ratio 0.77. Halter brown.

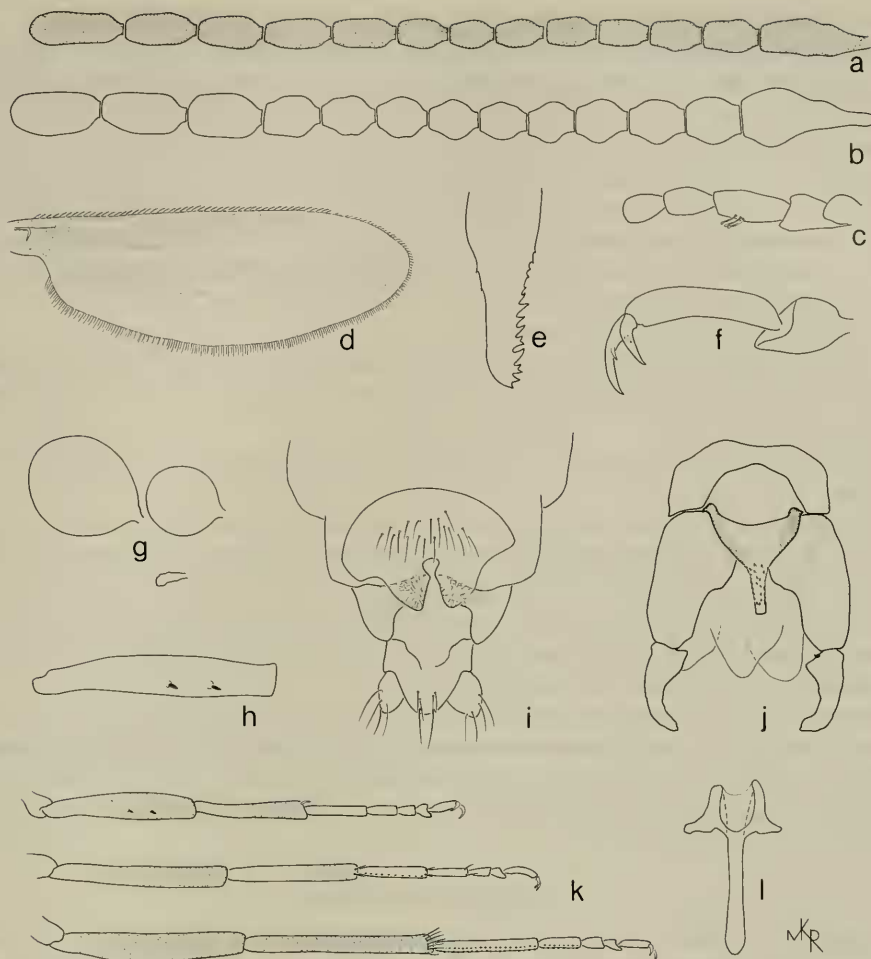


Fig. 5. *Bezzia twinni*. a, c-i, k, Female. j-l, Male. a, b, Antenna. c, Palpus. d, Wing. e, Mandible. f, Fourth and fifth tarsomeres and claws of hindleg. g, Spermathecae. h, Forefemoral spines. i, Genital sclerotization. j, genitalia, parameres omitted. k, Color pattern (top to bottom) of fore-, mid-, and hindlegs. l, Parameres.

Abdomen: Brown, with vestiture of sparse, fine setae; 2 pairs of short brown gland rods, posterior pair as long as the segment, other $\frac{1}{2}$ as long. Genital sclerotization (Fig. 5i) with 8th sternum brownish pigmented and bearing a patch of dense setae in midportion. Spermathecae (Fig. 5g) 2 plus rudimentary 3rd, slightly ovoid, only slightly tapering to very short, slender necks; highly pigmented; unequal, measuring 0.119 by 0.095 mm and 0.075 by 0.065 mm including necks.

Male allotype.—Wing length 1.54 mm, breadth 0.60 mm; costal ratio 0.74. Similar to female with usual sexual differences; pale areas at bases of femora and tibiae scarcely evident. Antenna (Fig. 5b) with lengths of flagellar segments in proportion of 32-14-13-13-12-12-12-12-13-13-18-21-22, antennal ratio 0.72; plume pale brownish, very sparse and the verticils short, longest only about $6\times$

diameter of a segment. Genitalia (Fig. 5j) longer than broad; 9th sternum with broad caudomedian excavation extending $\frac{2}{3}$ way to base of segment; basistyle with marked basal swelling on mesal side forming a pronounced hump, slender distally; dististyle about $\frac{1}{2}$ as long as basistyle, markedly curved, and slender on distal $\frac{1}{2}$, with pointed tip; aedeagus 1.15 longer than broad, basal arms forming an arch to $\frac{1}{5}$ of total length, ventral surface of distal process with numerous coarse spicules except at extreme tip which is nearly hyaline; parameres (Fig. 5l) with the anterolateral arms connected in a broad mesal plate extending nearly to extreme base, distal process slender on proximal $\frac{1}{2}$, slightly expanded subapically and clavately rounded at tip.

Distribution.—California, Manitoba.

Types.—Holotype ♀, allotype ♂, Churchill, Manitoba, 14.vii.1953, J. A. Downes (CNC). Paratypes, 3 ♂, 8 ♀, as follows: Churchill, same data as types except dates 14, 23, 24, 27.vii.1953.

Other specimens examined.—CALIFORNIA: Big Bear Lake, 6.vii.1942, A. L. Melander, 1 ♂.

Discussion.—This species is named for the late C. R. Twinn, head of the Veterinary and Medical Entomology Unit, Agriculture Canada, and in charge of the studies on biting flies at Churchill.

Four of the above specimens, recorded in error as *B. modocensis*, were collected as mating pairs at the swarming site, with the females feeding on the males through a puncture on the head (Downes, 1978: 38).

Bezzia twinni is closely related to *B. saileri*, sharing with that species the presence of scattered enlarged setae on the disc of the mesonotum and short antennae and palpi, but *B. saileri* is a much paler species with pale legs, whitish hyaline wings, the mesonotal setae are very numerous, and the male genitalia are stouter and form a somewhat circular outline.

The *dorsasetula* Group

Diagnosis.—Small, shining black species, female wing 1.2–1.3 mm long. Mesonotum with 2 rows of strong bristly setae on disc. Forefemur with 5–7 stout ventral spines of alternating uneven lengths arising from distinct elevations. Pupal respiratory horn only moderately broadened distally, apex with only 7–12 spiracular openings in an even row. Abdominal segments of pupa not broadened at midlength; tubercles small; posterolateral processes of last segment short and bluntly conical. Larva unknown.

Remarks.—There are only two North American species included in this group: *Bezzia dorsasetula* Dow and Turner and *B. obelisca* Dow and Turner. Both species have been reared from sphagnum bogs in the Northeast.

Bezzia dorsasetula Dow and Turner

Fig. 6

Bezzia dorsasetula Dow and Turner, 1976: 89 (male, female; New York; figs.).

Female.—Wing length 1.31 mm; breadth 0.47 mm.

Head: Dark brown. Eyes separated a distance of 0.029 mm. Antenna (Fig. 6a) brown, narrow bases of flagellar segments pale; lengths of flagellar segments in proportion of 15-10-10-10-10-10-10-10-22-22-22-22-22, antennal ratio 1.30.

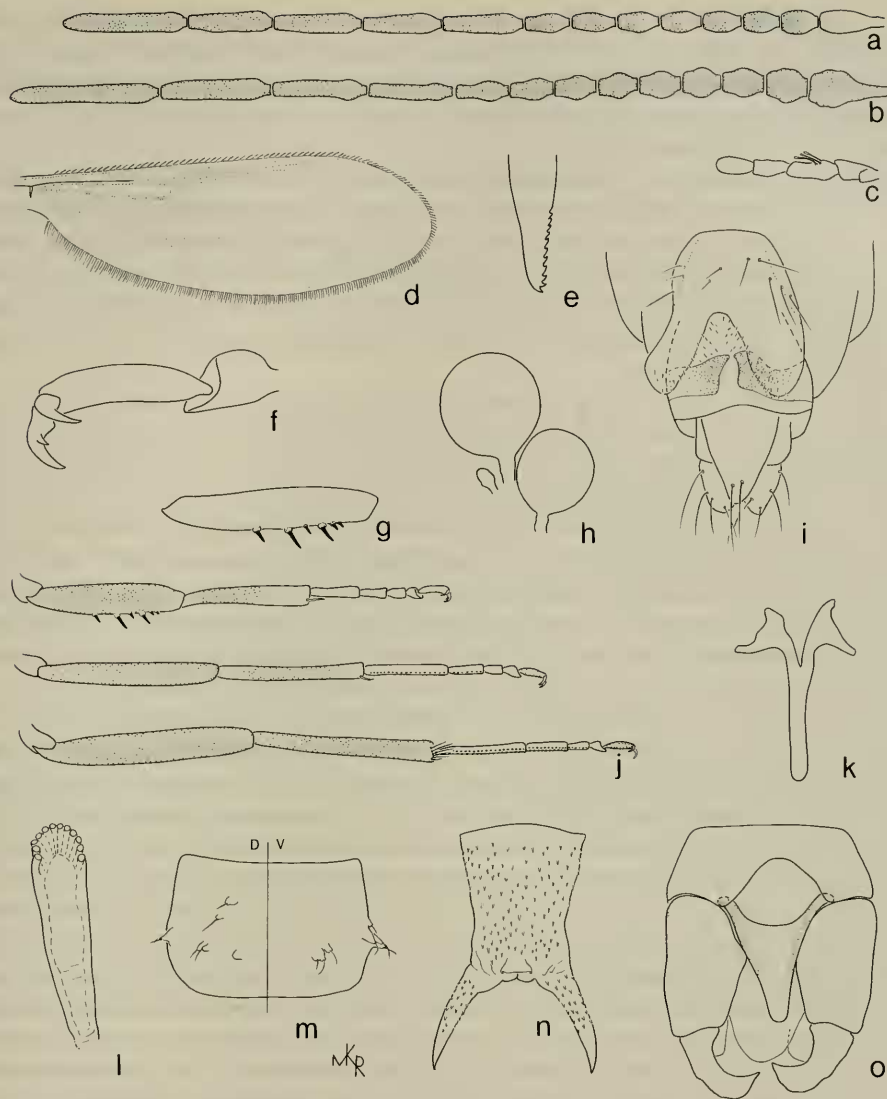


Fig. 6. *Bezzia dorsasetula*. a, c-j, Female. b, k, o, Male. l-n, Pupa. a, b, Antenna. c, Palpus. d, Wing. e, Mandible. f, Fourth and fifth tarsomeres and claws of hindleg. g, Forefemoral spines. h, Spermathecae. i, Genital sclerotization. j, Color pattern of (top to bottom) fore-, mid-, and hindlegs. k, Parameres. l, Respiratory horn. m, Dorsal and ventral views of fourth abdominal segment. n, Last abdominal segment. o, Genitalia, parameres omitted.

Palpus (Fig. 6c) brown; lengths of segments in proportion of 5-7-10-10-10; 3rd segment short and slender, palpal ratio 2.0. Mandible (Fig. 6e) with 8 teeth.

Thorax: Dark brown; mesonotum shining black, without pollinose pattern, with microscopic pubescence, with 4-5 long, relatively stout, blackish setae in posterior portion of each dorsocentral row; 3 similar pre-alar setae and 1 postalar; scutellum with 2 pairs of similar marginal setae. Legs (Fig. 6j) brown; narrow base and apex of forefemur slightly paler; narrow bases of all tibiae and broad apices of fore-

and midtibiae yellowish; tarsomeres 1–4 pale; forefemur (Fig. 6g) with 6–7 stout black ventral spines, irregularly alternating long and short spines in series; claws (Fig. 6f) short and slightly curved, stout at base, each with internal basal barb. Wing (Fig. 6d) pale grayish with coarse microtrichia, anterior veins pale brown; costal ratio 0.76. Halter brown.

Abdomen: Dark brown; vestiture of coarse brown setae. Two pairs of long pale brownish gland rods. Genital sclerotization (Fig. 6i) faintly pigmented; 8th sternum with a pair of elongate spiculate processes, bare anteromesad; 9th sternum a pair of pigmented processes flanking gonopore. Spermathecae (Fig. 6h) 2 plus rudimentary 3rd; subspherical with moderately long slender neck; unequal, measuring 0.051 by 0.048 mm plus neck 0.013 mm long, and 0.042 by 0.038 mm with neck 0.009 mm long.

Male.—Wing length 1.11–1.26 mm. Similar to female with usual sexual differences; setose vestiture of legs and abdomen longer and stronger. Antenna (Fig. 6b) with lengths of flagellar segments in proportion of 20-12-12-12-12-13-14-15-16-26-28-28-47; sparse plume of moderately long brownish verticils. Costal ratio 0.72. Genitalia (Fig. 6o): 9th sternum with broad, moderately deep, caudomedian excavation; basistyle moderately long, tapering; dististyle short and stout, strongly curved hooklike; aedeagus triangular, slightly longer than broad, basal arch to $\frac{1}{5}$ of total length, basal arms slender, tapering distally to moderately slender, rounded tip. Parameres (Fig. 6k) with deeply bilobed anterolateral plates, deep basomedian cleft; distal process long and slender, rodlike with rounded tip.

Pupa.—Length 3.1 mm; pale brown, dark brown on cephalothorax, tip of respiratory horns, and midportions of abdominal terga; cephalothorax and abdominal terga with coarse dark microtubercles. Respiratory horn (Fig. 6l) 0.22 mm long, relatively stout, evenly widened to tip, $3.7\times$ as long as greatest width; with 12 spiracular openings in a row around apex. Abdominal tubercles (Fig. 6m) short and blunt; three *lpm* tubercles, *lpm1* very small and located anterior to other 2, which are moderately elevated, triangular, all 3 with a minute seta; 2 pairs of very small *dasm* tubercles, each with a hyaline microseta, anterior pair located closer to midline and the 2 connected to each other by a micro-rugose integumental bar; 3 small *dpm* tubercles, each with a hyaline microseta, 2 laterals contiguous and much stronger than mesal tubercle; 3 low, scalelike *vpm* tubercles, *vpm2* and *vpm3* fused in a common tubercle bearing 2 hyaline microsetae, *vpm1* contiguous to others, more slender, with a hyaline microseta. Last abdominal segment (Fig. 6n) moderately long, $1.8\times$ as long as basal breadth; posterolateral processes moderately long and slightly curved, sparsely spinulose, tapering to pointed, moderately diverging tips; processes $\frac{2}{3}$ as long as anterior portion of segment.

Types.—Holotype ♀, Brantingham Lake, Lewis Co., New York, 22.vi.1963, W. W. Wirth (Type no. 76595, USNM). Allotype ♂, 2 ♂, 3 ♀ paratypes, from Tompkins Co., New York.

Recorded distribution.—New York, type series only.

New records.—CONNECTICUT: Norwich, 9.vi.1959, A. A. Hubert, light trap, 6 ♂, 2 ♀. FLORIDA: Wakulla Co., Ochlockonee River St. Park, 29.iv.1970, W. W. Wirth, light trap, 1 ♂. MARYLAND: Garrett Co., Cranesville Swamp, 6.vii.1960, J. Coulson, reared from sphagnum, 2 ♀. Prince George's Co., College Park, reared from Lakeland Pond, 21.v–11.vi.1975, W. L. Grogan, Jr., 4 ♂, 1 ♀ with pupal exuviae; Patuxent Wildlife Res. Center, v–vi.1976, Grogan, Malaise

trap, 3 ♂, 4 ♀; 30.v-8.vii.1978, Wirth, Malaise trap, 7 ♂, 1 ♀. Wicomico Co., Salisbury, 20-27.vi.1981, Grogan, Malaise trap, 1 ♀. Worcester Co., Snow Hill, 18.vi.1968, W. H. Anderson, light trap, 1 ♂. NEBRASKA: Cherry Co., Hackberry Lake, 2.vi.1969, Wirth, 1 ♂, 1 ♀. NEW YORK: Chautauqua Co., S. Dayton, 1.vi.1963, Wirth, marsh area, 2 ♂, 1 ♀. Lewis Co., Whetstone Gulf, 20-23.vi.1963, Wirth, 4 ♀. ONTARIO: Kemptonville, 5.vi.1960, Wirth, 1 ♂, 2 ♀. Ottawa, Mer Bleue, 25.vi.1954, J. R. Vockeroth, 2 ♀ (CNC). Stanleyville, Black Lake, 3,11.vi.1978, J. A. Downes, 3 ♂, 3 ♀ (CNC).

Discussion.—*Bezzia venustula* (Williston) from the West Indies is very similar to *dorsasetula*, but the dorsocentral setae are not strongly developed, and the strong black sensilla chaetica on the male antenna occur as far as the 15th segment.

Bezzia obelisca Dow and Turner

Fig. 7

Bezzia obelisca Dow and Turner, 1976: 104 (male, female; New York; figs.).

Female.—Wing length 1.20–1.26 mm; breadth 0.40–0.43 mm.

Head: Dark brown. Eyes separated by a distance of 0.036 mm. Antenna (Fig. 7a) brown; lengths of flagellar segments in proportion of 15-10-9-9-9-10-10-10-20-20-20-20-24, antennal ratio 1.27. Palpus (Fig. 7c) brown; lengths of segments in proportion of 4-8-10-9-13; 3rd segment short and slender, tapering, palpal ratio 2.0. Mandible (Fig. 7e) with 9–11 teeth.

Thorax: Shining dark brown; mesonotum with 7–8 long, stout, black setae in each dorsocentral row, extending nearly to anterior margin; 3 similar pre-alar setae and 1 postalar; scutellum with 2 pairs of similar marginal setae. Legs (Fig. 7j) brown, without pale bands; tarsomeres 1–3 pale; forefemur (Fig. 7g) with 4–5 stout black ventral spines, irregularly alternating short and long; claws as in Fig. 7f. Wing (Fig. 7d) grayish, anterior veins pale brown; costal ratio 0.77. Halter dark brown.

Abdomen: Brown. Two pairs of long brownish gland rods. Genital sclerotization (Fig. 7i) with 8th sternum a bare, U-shaped plate arching around gonopore anteriorly; 9th sternum fused posteriorly across midline, anteromedian processes hooklike. Spermathecae (Fig. 7h) 2 plus rudimentary 3rd; subspherical with long slender necks, deeply pigmented; slightly unequal, measuring 0.043 by 0.038 mm plus neck 0.017 mm long, and 0.040 by 0.035 mm with neck 0.011 mm.

Male.—Wing length 0.62 mm. Similar to female with usual sexual differences. Antenna (Fig. 7b) with lengths of flagellar segments in proportion of 18-10-9-9-9-9-9-9-10-15-15-16-20; plume extending to segment 11, segments 12–14 each with proximal ring of black verticils. Genitalia (Fig. 7o): Ninth sternum with broad, shallow, caudomedian excavation; basistyle short, somewhat swollen at base on mesal side; dististyle short, strongly curved hooklike, distal portion slender; aedeagus with base much narrower than in *dorsasetula*, basal arch low, sides straight, evenly tapered to slender rounded tip. Parameres (Fig. 7k) with antero-lateral plates not so deeply bilobed as in *dorsasetula*, distal process long and slender, rodlike.

Pupa.—Length 2.3–2.6 mm; brown, abdomen paler. Respiratory horn (Fig. 7l) 0.16 mm long, shaped as in *dorsasetula*, slightly broader distally, 4× as long as broad; with 7–10 spiracular openings in a row around apex. Abdominal tubercles

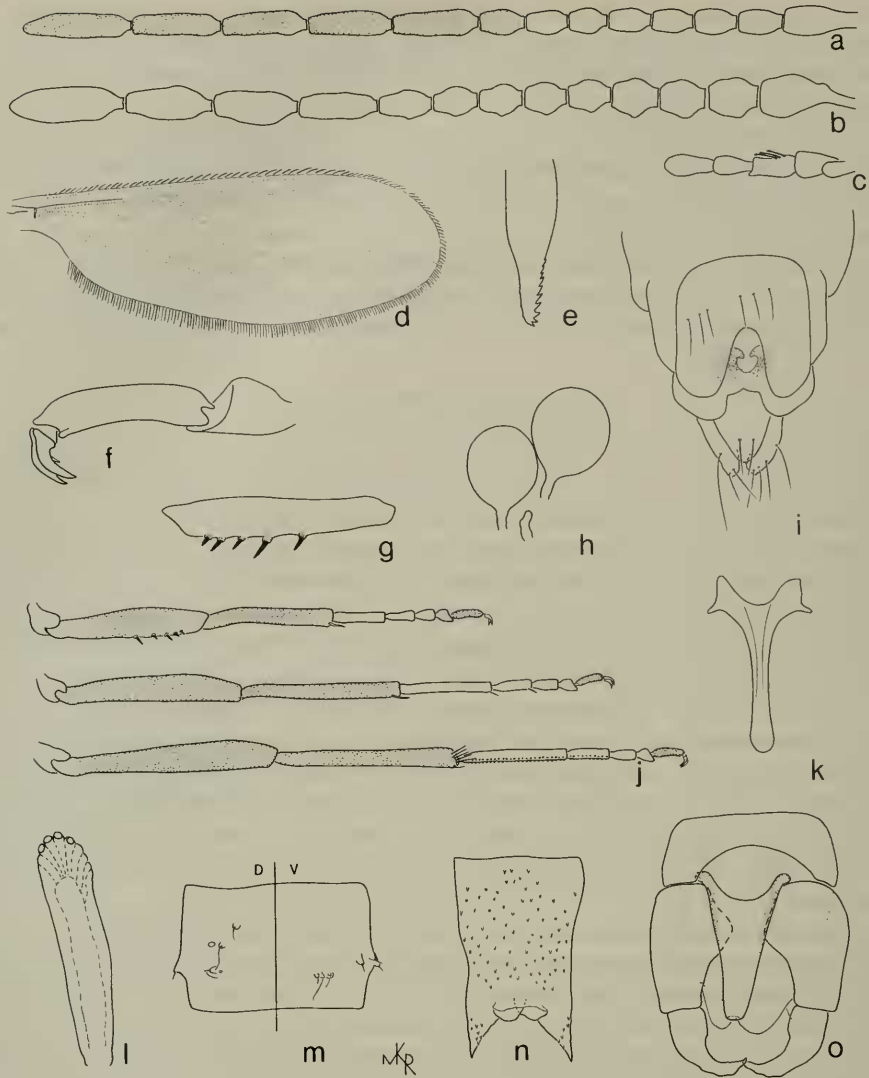


Fig. 7. *Bezzia obelisca*. a, c-j, Female. b, k, o, Male. l-n, Pupa. a, b, Antenna. c, Palpus. d, Wing. e, Mandible. f, Fourth and fifth tarsomeres and claws of hindleg. g, Forefemoral spines. h, Spermathecae. i, Genital sclerotization. j, Color pattern of (top to bottom) fore-, mid-, and hindlegs. k, Parameres. l, Respiratory horn. m, Dorsal and ventral views of fourth abdominal segment. n, Last abdominal segment. o, Genitalia, parameres omitted.

(Fig. 7m) small, short, and rounded to slightly pointed, each with a hyaline microseta. Integument of cephalothorax with sparse brown granules, that of abdomen with minute spinules only. Last abdominal segment (Fig. 7n) only slightly longer than basal breadth, posterolateral processes short, only $\frac{1}{4}$ as long as rest of segment, tapering abruptly to pointed tips and bearing only sparse thornlike spinules.

Types.—Holotype δ , allotype ♀ , 7 δ , 3 ♀ paratypes, McLean Reserve, Tompkins Co., New York, 19.vi.1963, W. W. Wirth, reared from sphagnum bog (Type no. 76596, USNM).

Recorded distribution.—New York (type series).

New records.—MICHIGAN: Cheboygan Co., Douglas Lake, vii.1954, R. W. Williams, light trap at boat house, 7 ♂, 5 ♀; emergence trap at Bryants Bog, 2 ♂, 2 ♀. NEW BRUNSWICK: Kouchibouguac, 11.vii.1977, J. R. Vockeroth, 1 ♀; 3–13.vii.1978, J. A. Downes, 3 ♂, 2 ♀ (CNC). NEW YORK: St. Lawrence Co., Cranberry Lake, 26.vi.1963, W. W. Wirth, sphagnum bog, 1 ♂, 1 ♀. ONTARIO: Ottawa, Mer Bleue, 27.v.1960, Wirth, reared from sphagnum, 15 ♂, 15 ♀ (slides), 55 pinned specimens, all with pupal exuviae.

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